

# Chapter 5 - Learning with LLMs

Murat Yıldızoğlu  
Bordeaux School of Economics  
University of Bordeaux  
UMR CNRS-INRAE 6060  
<https://yildizoglu.fr>

Master 1, IREF

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*"The human mind, magnificent yet finite, now gains an AI ally. Learning shifts: from memorizing answers to framing the right questions. It's not knowing all, but connecting all, that sparks true understanding. AI isn't replacing us; it's amplifying us. A new era of learning dawns. Observe carefully."*

*Albert Einstein (sort of...) by Gemini Flash 2 Experimental! :-)*

LLMs (present and future) open new avenues for learning of knowledge and analytical abilities.

Current LLMs can help to accelerate your learning process:

They can be your smart textbook, always update encyclopedia, summarizer, brainstorming companion, teacher, tutor, and restless repetition partner for any learning process.

## References for this chapter

- Bowen, J. A. and Watson, C. E. (2024) *Teaching with AI: A Practical Guide to a New Era of Human Learning*. John Hopkins University Press.
- Mollick, Ethan R. and Mollick, Lilach, *Assigning AI: Seven Approaches for Students, with Prompts* (September 23, 2023). The Wharton School Research Paper, [Available at SSRN](#)

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## Getting a relevant feedback

- LLMs learn through feedback... but you too!
- This is one of the main role for teachers: giving relevant feedback to help you correct your errors.
- Being humans, teachers feedback can come after quite long time (reading and grading all these exam papers take time)
- But, the best feedback is the most **immediate** one, just after the error happens.
- And the more **objective** they are, the easier to accept them and learn from them.
- An LLM can give such feedbacks
- But they would only be useful if it correctly understands the criteria to follow for evaluating your answer.

- No need for complex prompts to get useful feedback
  - Find the errors in this code/article/proposal.
  - Explain to me XXX
  - What are some other ways to phrase this idea?
  - Are there important points, data, or references I am missing?  
Is there important evidence I have not included?
  - Which passages/slides/arguments are least clearly stated?
  - Give me an outline of my text, with two or three bullet points per section.
- But you can do better (see the previous chapter)

## Giving context and criteria for better feedback

- Providing details about
  - The academic level: First year of bachelor in economics)
  - The course: Its content and structure, the main concepts studied, its slides, its approach, etc.
  - The assignment: The expected form, structure, methodology, and content
  - Grading criteria indicated by the teacher
  - assignment instructions, grading criteria
- Can help LLMs to give you a more relevant feedback about your work
- Ask for comments about your work, both positive and negative (strong and weak points of my analysis?)
- Ask for more feedback calling on more *vigilance*: Create feedback that will challenge me. Include feedback with inaccurate information and feedback that looks like a compliment but really is not.

*The best feedback should challenge student thinking, offer new perspectives, and spark dialogue, but also feel safe and supportive.*

*Bowen&Watson (2024)*

- Guiding the IA for the tone to adopt can make a big difference.
- A very sarcastic feedback can help some students but many will feel defensive

## Useful prompts: The usual suspects

- Your prompts should follow the general guidance introduced in the previous chapters and include components on:
- **Role:** Who do you want AI to be? Economics professor; teaching assistant; English/Math/X tutor; Mentor; friend; the mayor of Paris...
- **Task:** What do you expect from the IA? Quiz you and check your answers; check the quality of your work; give you guidance to better develop it; summarize it for you; translate it...
- **Evaluation criteria:** How it should evaluate your work? If you are preparing a first year study and it thinks you are preparing a PhD, its feedback will not be very adapted.
- **Relationship with you and tonality:** How should it react to make your work better? Be encouraging; be critical and pointing weaknesses; positive and helpful.
- **Process:** How should it articulate all these elements to provide its feedback? Describe different steps it should follow to compose its feedback.

## Example 1

*Act like a friendly but experienced researcher in XXX.  
Read my research plan and lead me through a dialogue that will challenge my perspectives on my research question.  
Ask me one question at a time to help me anticipate problems, locate gaps, and refine my plan.  
Do not improve my work yourself; only ask questions and give feedback.*

## Example 2

*Act like a friendly mentor.  
Ask questions on [my topic] to help me think about it and open my exploration of its different aspects.  
Ask me questions to help me consider different point of views on my topic and better understand them.  
Ask me questions on potential developments to help me imagine them.  
Ask me one question at a time and take into account my previous answers for conceiving subsequent questions.*

***You can ask LLMs take different roles to help you learn.***

AI USE	ROLE	PEDAGOGICAL BENEFIT	PEDAGOGICAL RISK
<b>MENTOR</b>	Providing feedback	Frequent feedback improves learning outcomes, even if all advice is not taken.	Not critically examining feedback, which may contain errors.
<b>TUTOR</b>	Direct instruction	Personalized direct instruction is very effective.	Uneven knowledge base of AI. Serious confabulation risks.
<b>COACH</b>	Prompt metacognition	Opportunities for reflection and regulation, which improve learning outcomes.	Tone or style of coaching may not match student. Risks of incorrect advice.
<b>TEAMMATE</b>	Increase team performance	Provide alternate viewpoints, help learning teams function better.	Confabulation and errors. "Personality" conflicts with other team members.
<b>STUDENT</b>	Receive explanations	Teaching others is a powerful learning technique.	Confabulation and argumentation may derail the benefits of teaching.
<b>SIMULATOR</b>	Deliberate practice	Practicing and applying knowledge aids transfer.	Inappropriate fidelity.
<b>TOOL</b>	Accomplish tasks	Helps students accomplish more within the same time frame.	Outsourcing thinking, rather than work.

Source: Mollick & Mollick (2023)

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- **How it Helps:** Explaining concepts, models, and theories with clear steps.
- **Ideal For:**
  - Understanding complex mathematical derivations.
  - Grasping the assumptions of economic models.
  - Preparing for exams.

## AI-Tutor: Prompt Examples (Student-Focused)

### 1 Prompt 1: The Solow Growth Model

"Explain the Solow growth model at a level appropriate for a first-year master's student. Include a step-by-step explanation of how an increase in the savings rate affects the steady-state level of capital per worker, output per worker, and consumption per worker, and explain the equations involved."

### 2 Prompt 2: Arbitrage Pricing Theory

"Explain Arbitrage Pricing Theory, including the underlying logic, factors, and its advantages and disadvantages in contrast to CAPM, and give it an example to solidify my knowledge."

- **Risk 1: Oversimplification:** The AI may omit important details.
- **Mitigation:** After the AI's explanation, ask: "What are the key limitations of this model/theory?"
- **Risk 2: Incorrect Information:** The AI may hallucinate or provide outdated information.
- **Mitigation:** Cross-reference with your textbook and lecture notes. Ask the AI to provide sources and check them!
- **Risk 3: Being too general:** You might not get enough out of it.
- **Mitigation:** When asking the AI to make an explanation, provide background information first for better answers: "When answering me, assume that I do not know calculus, and explain it so I can understand."

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- **How it Helps:** Reflect on past decisions to identify biases and improve future choices.
- **Ideal For:**
  - Evaluating investment decisions.
  - Assessing the validity of econometric results.
  - Understanding the limitations of your analytical framework.

## AI-Coach: Prompt Examples (Student-Focused)

### 1 Prompt 1: Trading Strategy Analysis

"I developed a trading strategy based on technical indicators. After running it for a month, it lost money. Help me analyze what went wrong. Guide me through a process to identify any biases I might have had when developing the strategy (e.g., confirmation bias, overconfidence). What could I have done to avoid these mistakes?"

### 2 Prompt 2: Interpreting Econometric Results

"I ran a regression to estimate the relationship between unemployment and inflation. The results are statistically significant but counterintuitive (positive relationship). What are potential reasons for this result? Help me consider alternative explanations (omitted variable bias, reverse causality). I want you to act professionally."

- **Risk 1: Generic Advice:** The AI may offer vague insights.
- **Mitigation:** Provide specific context about the decision and your thought process. What was the main source? What did you trust the most?
- **Risk 2: Bias Amplification:** The AI may reinforce your existing biases.
- **Mitigation:** Ask the AI to explicitly consider alternative viewpoints and challenge your assumptions.

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- **How it Helps:** Refining research papers, identifying weaknesses, and finding relevant sources.
- **Ideal For:**
  - Improving the clarity and rigor of your arguments.
  - Identifying gaps in your literature review.
  - Exploring alternative methodologies.

## AI-Mentor: Prompt Examples (Student-Focused)

### 1 Prompt 1: Literature Review Feedback

"I am writing a literature review on the impact of fintech on financial inclusion. Review my current draft [paste text here or attach it to the prompt], focusing on identifying any major gaps in the literature, suggesting key articles or authors I may have missed, and commenting on how well I have synthesized the existing research. What are some recent authors I did not mention?"

### 2 Prompt 2: Methodology Critique

"I am using GMM to address endogeneity in my model. Is this the right model [attach the paper and all information on the model]? Review my methodology section and comment on whether my instruments are valid and strong. Suggest alternative methods, assuming this process will be part of a formal paper."

- **Risk 1: Superficial Comments:** AI may provide generic feedback.
- **Mitigation:** Explicitly ask for specific and actionable suggestions. "Provide feedback to improve from an economist's perspective."
- **Risk 2: Outdated Information:** AI's knowledge base may be limited.
- **Mitigation:** Always verify suggested sources and methodologies with recent literature. "What steps are important to take next to make sure that the information that you use does not create an ethical dilemma?"

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- **How it Helps:** Generate ideas, challenge assumptions, and explore different perspectives.
- **Ideal For:**
  - Developing investment strategies.
  - Evaluating policy options.
  - Solving complex problems.

## AI-Teammate: Prompt Examples (Student-Focused)

### 1 Prompt 1: Portfolio Diversification

"I need more assets with relatively low correlations and high returns. Brainstorm alternative asset classes to improve portfolio diversification, going beyond traditional stocks and bonds. Analyze potential problems or drawbacks with assets with the most value."

### 2 Prompt 2: Policy Options and Issues

"We are assigned with the task of analyzing the economic impact of a carbon tax. It would be implemented in a small open economy. Generate a list of economic arguments for and against it, and then provide me with possible ethical issues of each argument."

- **Risk 1: Groupthink Reinforcement:** AI may reinforce dominant viewpoints.
- **Mitigation:** Instruct the AI to explicitly play "devil's advocate" and challenge common assumptions. "What would someone against this policy consider to be the possible downfalls? Then, address his thoughts, and convince him of your claim."
- **Risk 2: Over-Reliance on AI Ideas:** Relying too much on suggestions.
- **Mitigation:** Use AI to create your answer, then edit its problems."

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- **How it Helps:** Automate repetitive tasks, generate code, summarize complex documents, and translate jargon.
- **Ideal For:**
  - Data Analysis and data mining.
  - Writing scripts for econometric simulations.
  - Writing formal high-level papers.

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- **How it Helps:** Develop financial simulations and scenarios.
- **Ideal For:**
  - Practicing different situations with the correct method.
  - Practicing interview questions.

## AI-Simulator: Prompt Examples

### 1 Prompt 1: Stock Portfolio Manager Interview

"You are preparing for a Stock Portfolio Manager. Ask me a broad range of questions, and then grade my answers and tell me how I would act on them. Be tough."

### 2 Prompt 2: Ethical questions

"I am a junior financial analyst, and my team is suggesting using a dubious technique to get an estimate for our models. Enact different responses by each, to explore different strategies. At the end, ask me what the ethical considerations are for the event. Then, explain which laws I would be breaking."

- **Risk 1: The simulations may not always be correct.**  
What was the source or logic for those choices.
- **Mitigation:** Use several different sources to make your answers.

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- **How it Helps:** Explain concepts to the AI and make sure you understand them well.
- **Ideal For:**
  - You understand the core details better.
  - Find the best ways to solidify and test your knowledge.

## AI-Student: Prompt Examples

- ① **Prompt 1: Value at Risk**  
"I will teach you what VAR analysis is, and then we will create a stock portfolio to minimize its risk."
- ② **Prompt 2: Monetary Policies**  
"I will teach you what monetary policies are, and we will discuss which methods are proper for the economy today."

- **Risk 1: Difficulty in teaching if you are confused.** This will get worse, and you will have to redo the lesson.
- **Mitigation:** Review it with the sources.
- **Risk 2: AI will refuse to do it or give vague and non-committal answers.**
- **Mitigation:** Use a different AI.

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## Key Takeaways

- AI empowers better understanding and helps you with analysis.
- It became a precious tool in your learning, in different roles.
- With some pitfalls, and one very important caveat: you must adopt a very **ethical approach** when you use it.
- **It may assist you but should never do your work in your place.**
- You must be very transparent when you use AI as an assistant on how.
- Use it as a tool, not for a replacement for your analytical capacity.
- Otherwise, your ability will not develop and you will never be better than the AI.
- And, if the AI is better than you, who would hire you?

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